**[Energy Systems part 2](http://www.vcehelp.com.au/energy-systems-part-2-77/" \o "Permanent Link to Energy Systems part 2)**

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**Table of contents for VCE PE - energy systems**

1. [VCE Physical Education - energy systems part 1](http://www.vcehelp.com.au/vce-pe-energy-systems-76/)
2. Energy Systems part 2

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We have three ways in which this ATP can be resynthesised and hence, we have three energy systems; the phosphagen system, the lactic acid system (anaerobic glycolysis) and the aerobic system (aerobic glycolysis). Each of these systems varies in the rate at which ATP is supplied, the duration for which ATP can be supplied and the type of fuel (food) that is used to manufacture ATP.

The phosphagen and lactic acid systems are also known as anaerobic energy systems as they do not rely on the presence of oxygen to manufacture ATP. These are the energy systems we use for high intensity activity such as sprinting, jumping, lifting etc. Unfortunately, these systems are not able to maintain that supply due to fatiguing factors and therefore the duration of high intensity activities is short.

The phosphagen system uses creatine phosphate (CP) as a fuel. This substance is already stored in minimal amounts in our muscle. The lactic acid system uses stored muscle glycogen (the stored form of the carbohydrate we eat) as fuel. Under normal circumstances, there is an adequate supply of glycogen stored in our muscles, but the lactic acid system results in the accumulation of metabolic by-products resulting in fatigue causing us to slow down or stop. This is the ‘heavy’ or ‘painful’ feeling in our muscles at the end of a 400m or 800m race.

The third energy system is the aerobic system and it requires oxygen for the manufacture of ATP. This system is able to supply numerous amounts of ATP for a relatively long period before fatiguing factors cause the cessation of exercise. However, the supply of ATP is slow in comparison to the anaerobic systems and it is used for activities that are not high intensity and need to be performed for longer periods such as jogging, marathon etc. The aerobic system uses glycogen for fuel, but it also uses triglycerides and free fatty acids (from the breakdown of fat we eat) as fuel along with protein in extreme circumstances.

In high intensity or maximal exercise, we use all three energy systems to provide ATP. However, at any one point of time, we say that one particular energy system predominates in the supply of ATP – in other words, it is the major contributor of ATP for that activity at that point of time.

With regard to energy systems, you will need to ensure you fully understand;  
\* the time frames for the predominance of a particular energy system in maximal exercise  
\* the advantages and disadvantages of each energy system  
\* the fuels used by each system  
\* the limiting/fatiguing factors of each system  
\* examples of sporting activities in which a particular energy system is predominant





